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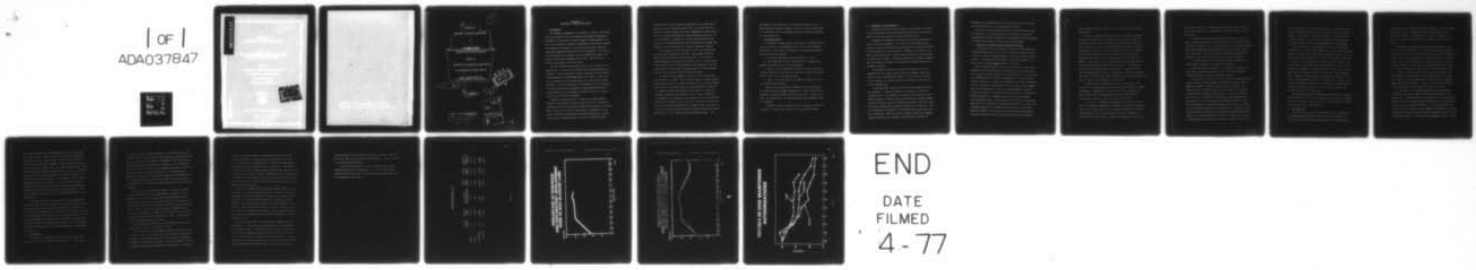

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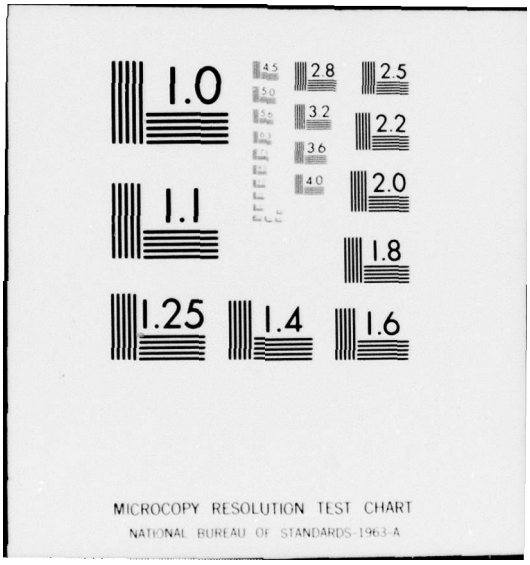
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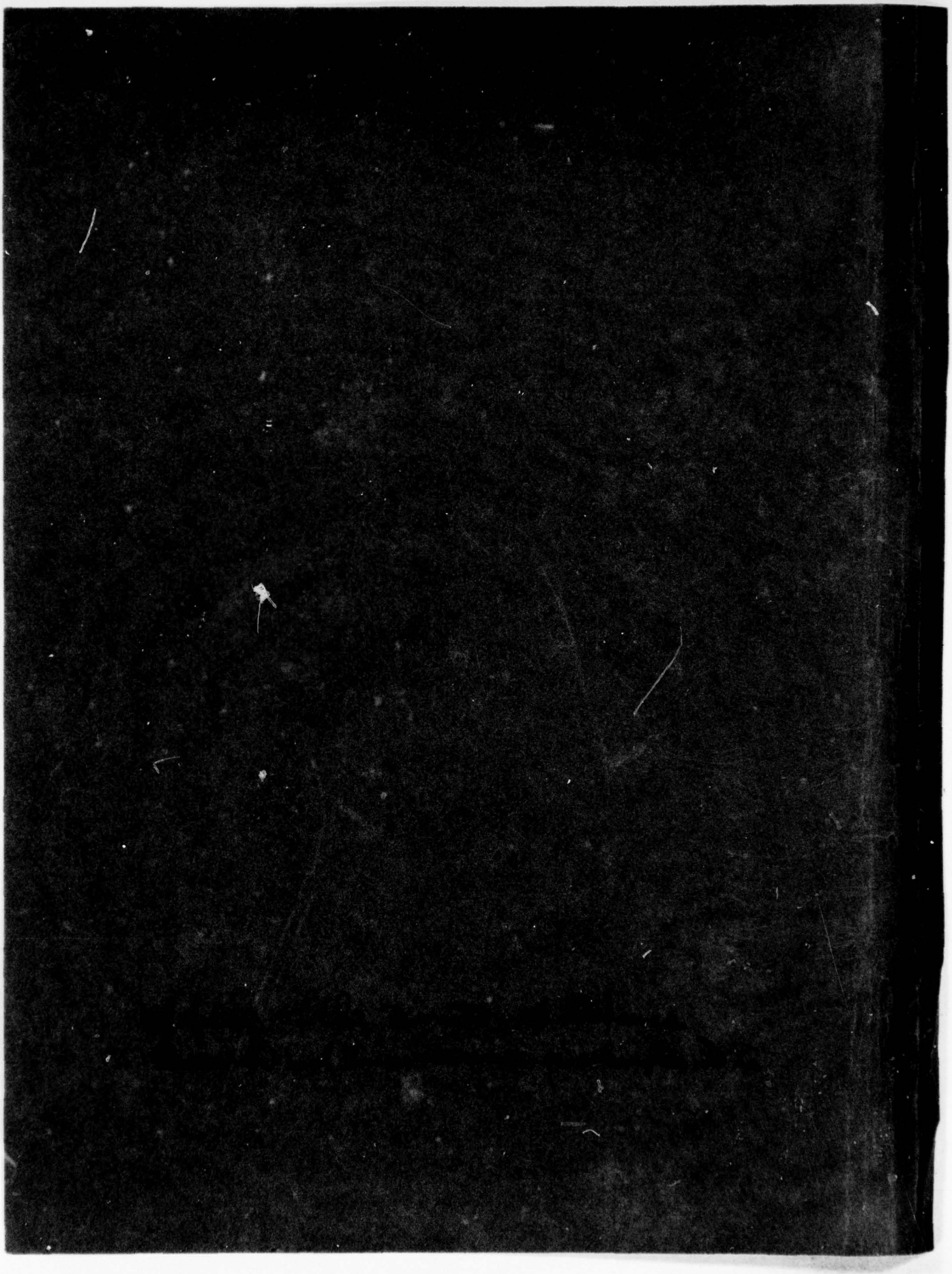

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(6) STATEMENT ON

DEPARTMENT OF DEFENSE LABORATORIES,

BY

DR. JOHN L. ALLEN
DEPUTY DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING
(RESEARCH AND ADVANCED TECHNOLOGY)

BEFORE THE

SUBCOMMITTEE ON RESEARCH AND DEVELOPMENT,

OF THE COMMITTEE ON ARMED SERVICES

HOUSE OF REPRESENTATIVES,
THE 95TH CONGRESS, FIRST SESSION

(10) John L. Allen

(11) 28 MARCH 1977

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STATEMENT ON
DEPARTMENT OF DEFENSE LABORATORIES

I. Introduction

Mr. Chairman and Members of the Committee: My name is John Allen, and I am the Deputy Director for Research and Advanced Technology in the Office of the Director of Defense Research and Engineering. I am here at your request to discuss the Department's R&D laboratory system. As indicated on viewgraph #1, the three Services operate almost 80 laboratories employing about 60,000 civilian personnel. Fifty-five of these laboratories are hardware oriented, spanning the range of the physical sciences and engineering disciplines. Twenty-seven are devoted to the medical and life sciences.

The DoD laboratories have played a vital role in support of our Armed Forces. I am sure you are familiar with such highlights as the discovery of radar by the Naval Research Laboratory and the invention and development of the SIDEWINDER missile by the Navy at China Lake and the proximity fuze by a predecessor of the Army's Harry Diamond Laboratory. In the period during and following WW II, our so-called "in-house" laboratories represented a unique R&D capability and in those days most of our new weapon systems were developed in whole or in part by our in-house laboratories.

However, in recent years the situation has changed markedly. Industry has developed a large and vigorous military R&D capability, employing about four times as many scientists and engineers in military R&D as we have in the in-house laboratories. Furthermore, in this period technology has become much more highly specialized. Whereas 20 years ago it was quite common to construct breadboard systems

entirely within a small laboratory equipped with little more than a soldering iron, an oscilloscope and a lathe, we now find that even experimental devices require specialized integrated circuits, the use of exotic materials and highly specialized machining techniques. We can afford neither to purchase nor maintain such specialized capabilities in the laboratories and hence must depend more strongly upon industry for our fabrication needs, even for experimental models.

As a consequence of these trends, the role of the laboratories has been slowly changing over the years. These changes have been driven also by the basic free enterprise policy of the country to depend as heavily as possible on the private sector. Even the industrial supervision role of the laboratories has diminished as the DoD adopted the use of professional Program Managers for system development outside and distinct from the laboratory complex.

The result of these changes on the nature of the laboratories' workload has been dramatic. Work in direct support to systems development and procurement (i.e., Budget Categories 6.3 and 6.4) has dropped. Such activities constituted about 54% of the laboratories' effort in the mid-60's and have now declined to only about 35%. Since few deliberate adjustments were made in the size or the orientation of the laboratories in response to these changing trends, the laboratories weathered the situation as best they could. Statistics show that they took on more non-RDT&E funded work and assumed an ever increasing fraction of the Technology Base program (our Research, Exploratory Development and a bit of our Advanced Technology Demonstrations). The

involvement of both industry and the university community in the Technology Base diminished markedly. This fact was forcefully brought to the attention of DoD, the Administration and Congress by spokesmen for those communities.

II. Secretarial Action

In recognition of these trends, the Secretary of Defense directed early in 1974 that a comprehensive review of our in-house laboratory complex and its utilization be undertaken. He specifically directed that four issues be addressed:

a. Does DoD really need in-house laboratories? If so--

b. How should the Services' RDT&E structure be organized and managed to get the most out of the laboratories?

c. What is the most appropriate division of effort between the in-house laboratories, industry, the universities, and other performers in the various areas of the RDT&E program?

d. What is the proper size of the laboratory complex in view of the foregoing considerations?

A major study was initiated by ODDR&E and the three Services. This study has been thoroughly documented in a report entitled, "DoD Laboratory Utilization Study," dated April 28, 1975. A copy of this report was transmitted to the R&D Subcommittee staff immediately upon its completion.

I propose to confine my remarks here to the answers we found to questions a, c and d, since question b is not directly relevant.

allegiance and the knowledge of military needs that comes from a long and close association of a career government position.

Therefore, the study concluded that an in-house laboratory system was a necessity. Its principal reason for existence is its role in coupling state-of-the-art technology into contemporary military problems in a manner fully cognizant of past successes and failures.

IV. The Division of Effort Between In-House and Contract

As indicated above, the allocation of effort in direct support of system development (work in 6.3, 6.4 and procurement-funded activities) is under the control of Program Managers. This work is heavily contract oriented. The laboratories' involvement is small and declining. Our concern here is keeping enough laboratory involvement.

Hence, consistent with our view that the principal utility of the laboratory lies in the marriage of technology and military needs, that is, in system development support, we have taken steps to try to reverse this downward trend in the use of the laboratories. However, we must exercise caution not to force Program Managers into actions inconsistent with their position of responsibility for the conduct of their programs. Thus, we have taken steps to assure that Program Managers carefully consider the possible use of the laboratories and that the laboratories' technical judgment be a documented part of the system development decision-making process. We now require that the Decision Coordinating Paper (DCP) for each new major system proposed contain a technical risk assessment generated by an identified DoD laboratory of the Program Manager's choosing. This stimulates more Program Manager-Laboratory interaction which also gives the laboratories a better opportunity to

convince Program Managers of their value to the success of the development program.

The area of principal concern with respect to possible excessive laboratory involvement is our $2.3B/yr. Technology Base program. The motivation for the concern of the industrial and academic communities about the nature of our Technology Base program is readily apparent in viewgraph #2. As a result of level funding and inflation, the number of scientists and engineers that we can employ in Technology Base activities (our "level of effort") decreased by 45% over the last decade. As can be seen in the viewgraph, virtually the entire burden of the decrease was borne by the contract programs. The laboratory level of effort remained essentially constant. Viewgraph #3 shows that the laboratories' portion of the Technology Base program increased from about 23% to about 43% as the program shrunk, since the laboratories did not share in the shrinkage in level of effort.

We believe that a strong contract program is important to the vitality of the Technology Base and to its effective transfer to system development. Consequently, we conclude that we are now putting too small a share of our Technology Base funds into industry and the universities. Among the reasons for this conviction are:

a. The U.S. is committed to using industry as the prime source for the development and production of almost all new military hardware. Therefore, it is necessary that new technology ultimately find its way into industry to be effectively applied. For new technology to be effectively and wisely applied, industry must understand it and feel

that they can produce it. The technology transfer problem is therefore facilitated if much of the technology is developed in industry in the first place.

b. Industry has particularly high technology skills in certain areas and large investments in special facilities that we cannot afford to duplicate in-house, e.g., for the production of solid state electronic devices and systems and for precision machinery, such as gas turbines. To be able to use our most recent fabrication technology for further advances, we must use the best available fabrication capability.

c. Our well-spring of effort in the fundamental sciences--the strong suite of academia--is in danger of running low.

On the other hand, we recognize, as pointed out in Section III, that industry and academia cannot do it all. There are compelling reasons to maintain a healthy DoD laboratory system.

Let me elaborate further on some of our needs for the laboratories. First, in areas of limited industrial or academic interest, such as explosives research, explosive ordnance disposal technology, and chemical warfare, the DoD laboratories are virtually our sole source of expertise and certainly our best source. Second, even though we must often turn to industry for fabrication of experimental devices and apparatus, it is often appropriate and highly desirable to have the experimentation, testing and evaluation done in whole or in part in the DoD laboratories and to use the laboratories' familiarity with Service problems to decide in what direction the technology should be pushed. It is often necessary to do the testing there, since many of our laboratories have unique test facilities. Lastly, in order to be

smart technical buyers, we must maintain a cadre of people with state-of-the-art knowledge who do not have commercial allegiances and who can provide a quick response to urgent DoD problems. This cadre must be reasonably permanent to provide a corporate memory of past problems, successes and failures and to preclude repeating previous mistakes.

We feel the best way to meet these needs is via an active and technologically involved in-house laboratory community staffed by career people. To maintain their skills and to command the respect of our contractors, they must personally be involved in technology so there must be a portion of the Technology Base conducted in-house. However, we can find little justification for the doubling of the "in-house ratio" indicated in viewgraph #3. Consequently, we concluded in 1974 that we should move back toward our earlier in-house ratio in the Technology Base. However, industrial interest has decreased in some areas in the interim. Balancing these factors, we concluded that a DoD goal of 30% in-house, as shown in viewgraph #4, was appropriate. As DARPA has very little in-house involvement, a ratio of 30% can be reached if the Services achieve a 35% in-house ratio.

This decision was made in consonance with the decision to increase the total level of effort in the Technology Base at the rate of slightly more than 5% per year. Thus, overall, the actual reduction in in-house level of effort has not been very large.

V. The Size Issue

We realize that the trend of declining use of the laboratories by the Program Managers would be reversed slowly at best and that the reversal of the trend toward an increasingly in-house Technology Base

program would further reduce the laboratories' support. We also recognize that there is a general downward trend in civilian manpower in the Department of Defense. Considering these factors, assessments were made of the impacts of various levels of reduction in the laboratory system.

Individual Service studies were reviewed for indications of the effects of various reductions. The Army was contemplating substantial reductions as a result of the Army Materiel Acquisition Review Committee (AMARC) study of Army laboratories. The Navy had conducted an in-depth study of one of its laboratories and concluded that some of the work could be terminated. The Air Force had expressed the desire to terminate in-house research and a small amount of their development activities. It was also noted that the cost of the in-house program in the laboratories had escalated faster than the RDT&E budget for the past several years so that the laboratories' in-house portion of the RDT&E budget had increased about 15%. Finally, it was noted that attrition in the laboratories typically runs very close to 5% per year.

On these bases, after extensive negotiation between DDR&E and the Assistant Secretaries (R&D) of the Military Departments, it was decided that a personnel reduction of 10% spread over a two year period would be appropriate, and would reduce the pressure on the laboratories to take on work of marginal suitability. It was also recognized that a 10% reduction spread over two years could be accommodated by attrition, although the Services were urged to make the drawdown selective in areas of diminishing interest. This resulted in an initial decision to reduce

ıtely 10% over a two year time
ıs the base for the reduction.
tiations between DDR&E and the
of 2900 from the Army RDT&E pro-
rmy under the AMARC Study), 3000
from the Air Force. Further dis-
d the Services resulted in an
the drawdown so that it would be
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ermore, that these drawdowns of
s the RDT&E "contribution" to any
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le suffered less of a percentage
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that the in-house ratio in the
and held at 35%. The Navy and

Air Force have agreed to these obj
the most in-house oriented, has no
able level are still taking place.
3000 from the Navy, and 1000 from
the end of FY 1978. The size of t
Navy and Air Force to reach an in-
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It is apparent that since the Army
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The Air Force has completed i
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The Technology Base in-house
the Navy and Air Force to reach

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be reduced. We have made observa
we thought to be excessively in-
to reduce in those areas which a

and those areas which appear to be maturing technologies. We have encouraged the Services to use this as an opportunity to cull out entire organizations of marginal need or quality rather than applying the reductions in an across-the-board, pro rata basis. The objective of this guidance was to minimize adverse personnel impact and to achieve an innovative R&D program. Specific implementation of the reductions as to organizations and technical areas, however, was left at the prerogative of the Services, consistent with their perception of their needs and other relevant factors.

In brief, I'd summarize the OSD position as this: We recognize the need for a strong DoD laboratory system. Nevertheless, the world has changed markedly in the past ten or twenty years and these changes translate into a moderately diminished need for laboratory support; less use of the laboratories for support to system development and the need for a larger Technology Base contract program. Failure to adjust the laboratories' manpower in recognition of these trends merely postpones the reckoning and increases the problem. That's not responsible management.

We are eminently aware of the problems the drawdown causes the laboratories. I came from one of the laboratories and so did many of my professional staff. I know and have talked to many, if not most, of the laboratory management people so I am well aware of their concerns. We have tried to ease the adjustment several ways. First, by spreading the action over several years. Second, by seeking--and with your help getting--a consistent increase in the actual level of the

Technology Base so that the ratio is more easily reached. Third, we have taken steps to encourage the Program Managers to reverse the trend of decreasing laboratory usage.

It has been our intention to strike a balance between acting responsibly and acting with compassion. I believe we have struck a reasonable balance and that we should therefore move ahead to finish the adjustments we have begun.

DOD R&D LABS (FY 75)

	NO. OF LABS	INVEST. ($M)	IN-HOUSE PROGRAM ($M)	TOTAL MIL. PERS.	TOTAL CIV. PERS.	TOTAL PROF. CIV. PERS.
ARMY	36	7,600	700	2,800	22,000	10,000
NAVY	27	2,400	850	2,600	29,000	12,000
AIR FORCE	16	1,400	370	8,500	9,300	3,800
TOTAL	79	11,400	1,920	13,900	60,300	25,800

Figure 1

PERCENTAGE OF RESEARCH AND EXPLORATORY DEVELOPMENT DONE IN DOD IN-HOUSE LABS

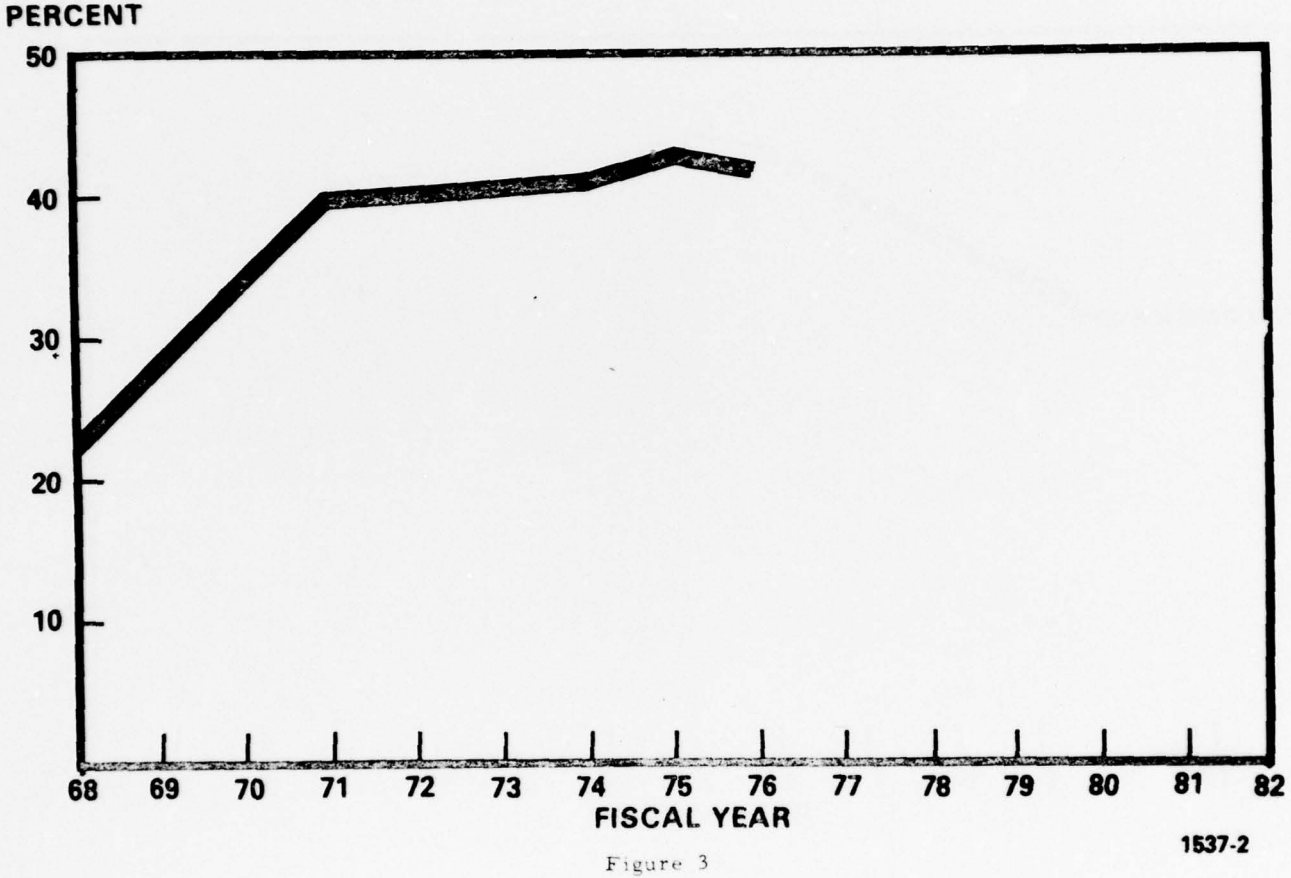

Figure 3

PERCENTAGE OF RESEARCH AND EXPLORATORY DEVELOPMENT DONE IN DOD IN-HOUSE LABS

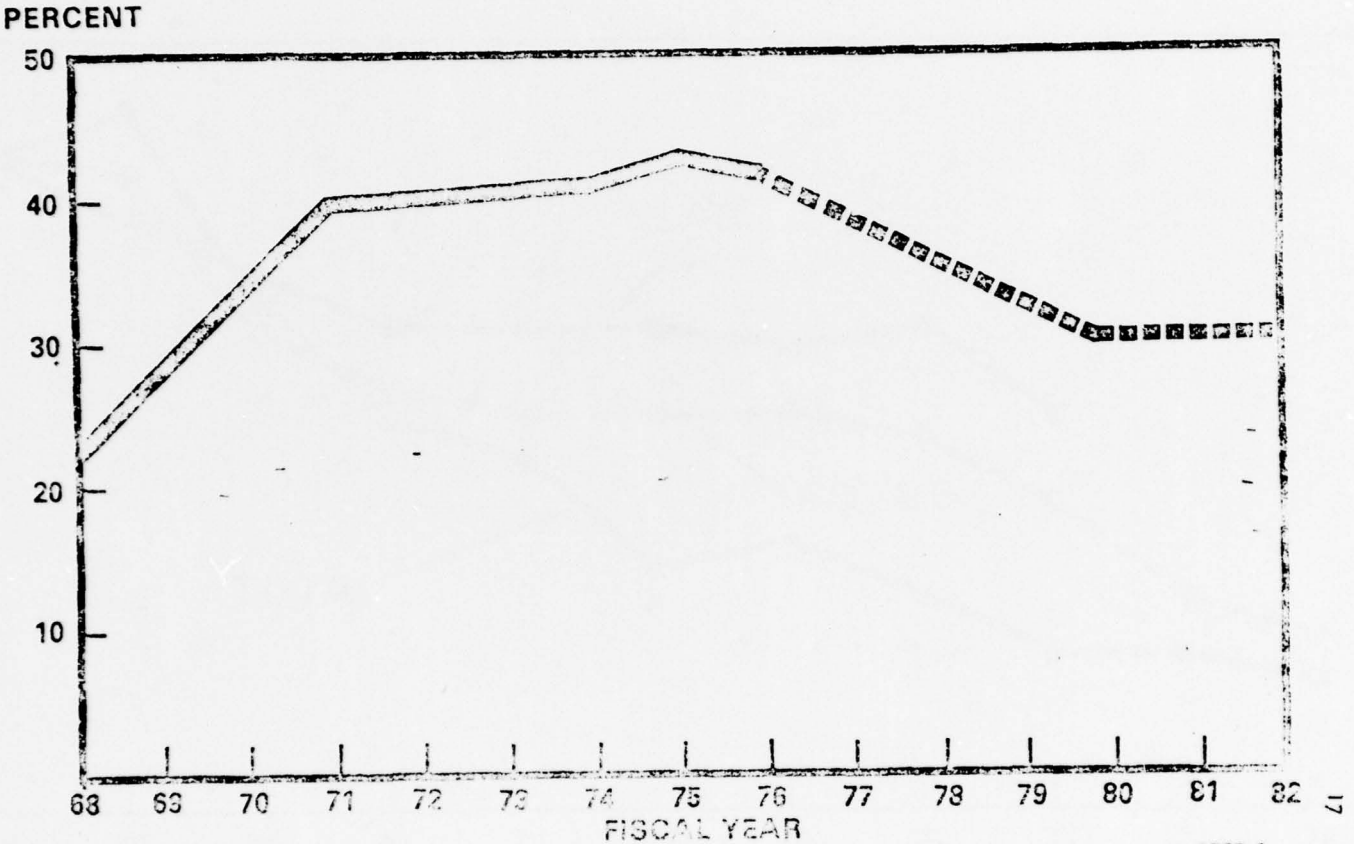

Figure 4

TRENDS IN DOD MANPOWER AUTHORIZATIONS

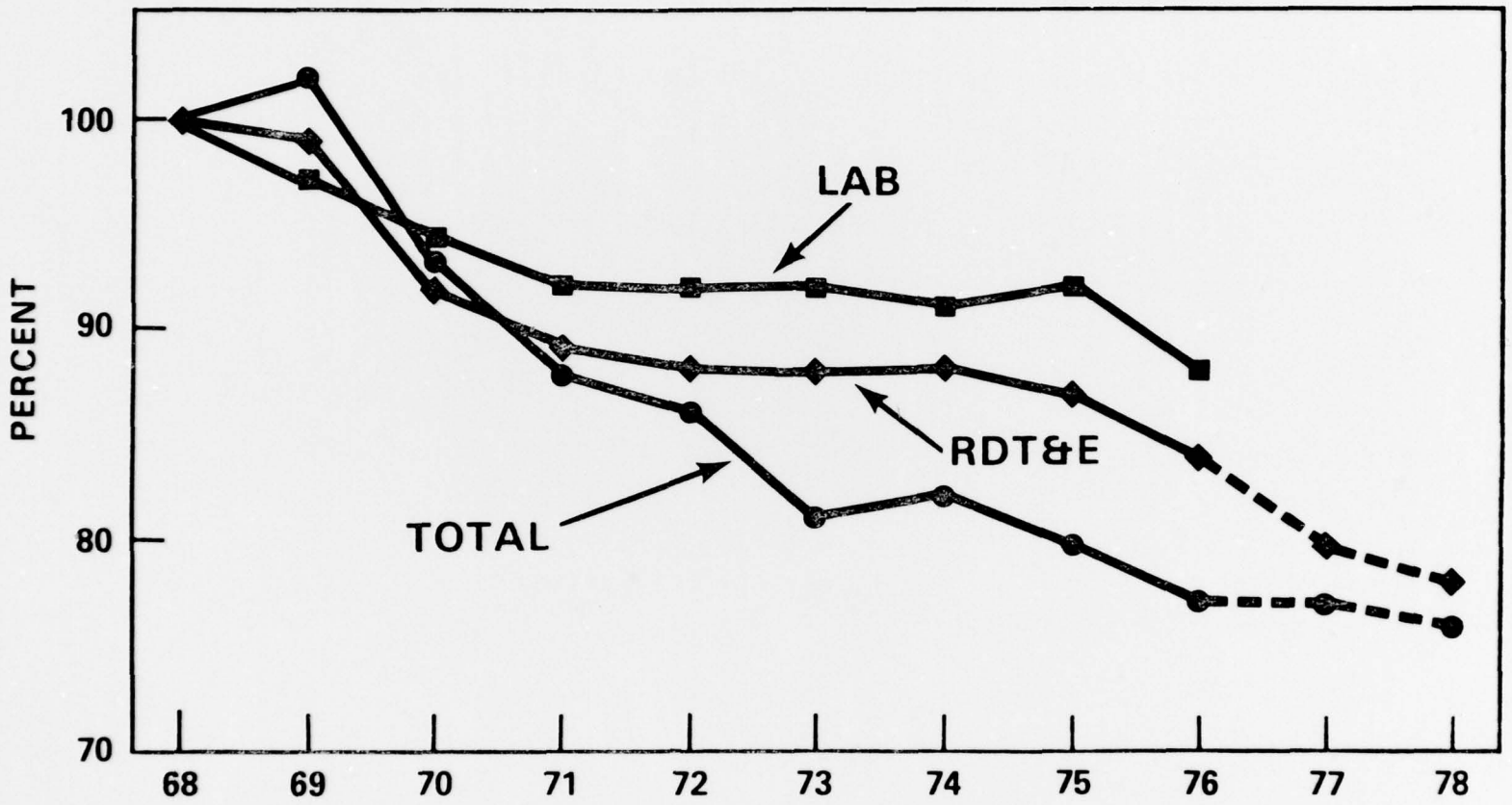

Figure 5

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